

OPTICAL SEMICONDUCTOR COMPONENT

FIELD OF THE INVENTION

The present invention is directed to an optical semiconductor component,
5 and more particularly, to an optical semiconductor component applied in light
emitting diodes (LEDs).

BACKGROUND OF THE INVENTION

Light emitting diodes (LEDs) are the most popular optical semiconductor
10 components at present. They can be applied to electric appliances, medical
instruments, traffic lights and other equipments capable of emitting light.
Currently, many companies are working hard to improve the inner components
of the LEDs to make the LEDs function better with improved light-emitting
effects.

15 The “optical semiconductor assembly”, disclosed in Taiwan Patent No.
315528, is a radial transmitting or receiving semiconductor assembly. In the
optical semiconductor assembly, a semiconductor chip capable of radiating or
receiving light is secured on a chip carrier comprising a conducting wire holder.
A surface of a trough of the optical semiconductor assembly is a reflector used
20 to radiate or receive light. The chip carrier is an electric and thermal component.
Further, the semiconductor and at least a portion of the chip carrier are
surrounded by a package body.

Reference is made to fig. 1, which is a schematic diagram of the
conventional optical semiconductor assembly disclosed in the patent mentioned

above. It includes a semiconductor chip 1, a trough 4, multiple first connecting regions 11 and multiple second connecting regions 12.

The patent mentioned above has following drawbacks:

1. The chip carrier comprising the conducting wire holder is a common path for electricity and heat. When the chip carrier is connected to a metal radiator, it may cause electricity leakage.
2. The connecting component is a single component plus the chip carrier. It can only provide the photodiodes with same driving voltage to connect with each other in parallel.

Accordingly, as discussed above, the prior art still has some drawbacks that could be improved. The present invention aims to resolve the drawbacks in the prior art.

SUMMARY OF THE INVENTION

An objective of the present invention is to provide an optical semiconductor component, including a plurality of conducting wire holders, a plurality of independent chip carriers secured on the conducting wire holders, a plurality of semiconductor chips secured on the independent chip carriers;, and a first curved surface made of a portion of the conducting wire holders, the semiconductor chips being placed at a focus of the first curved surface, a plurality of independent connecting components made of another portion of the conducting wire holders, and a second curved surface surrounded by a package body, the semiconductor chips being placed at a focus of the second curved surface.

The chip carriers of the present invention are independent components and have a multi-layer structure. The middle layer of the chip carrier is an insulator used to separate the chip from the conducting wire holder electrically or thermally. Hence, when connected with a metal radiator, the chip carrier does not cause electric leakage. Further, the connecting components of the present invention are mutually independent, which can provide multiple photodiodes with different driving voltages to connect with each other in series or parallel.

Numerous additional features, benefits and details of the present invention are described in the detailed description, which follows.

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BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing aspects and many of the attendant advantages of this invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description, when taken in conjunction with the accompanying drawings, wherein:

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Fig. 1 is a schematic diagram of a conventional optical semiconductor assembly;

Fig. 2 is a schematic diagram of an optical semiconductor component in accordance with the present invention; and

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Fig. 3 is a cross-sectional diagram of the optical semiconductor component taken along the hatching 3-3.

DETAILED DESCRIPTION

Reference is made to fig. 2 and 3. Fig. 2 is a schematic diagram of an

optical semiconductor component in accordance with the present invention and Fig. 3 is a cross-sectional diagram of the optical semiconductor component taken along the hatching 3-3. The optical semiconductor component includes multiple semiconductor chips 6 respectively disposed on chip carriers 8, which
5 are secured on conducting wire holders. The chip carrier 8 has a multi-layer structure. The upper surface of the chip carrier 8 is a conductor for electrically connecting with the semiconductor chip 6. The middle layer of the chip carrier 8 is an insulator (not shown) used to separate the semiconductor chip 6 from the conducting wire holder. The lower surface of the chip carrier 8 can be a
10 conductor or insulator.

The first curved surface 10 is made of a portion of the conducting wire holder and the chip is placed at a focus of the first curved surface 10. The surface of the first curved surface 10 is coated with a material able to enhance the reflective capability. The first curved surface 10 can be a paraboloidal or
15 ellipsoidal surface. The independent connecting components 14 are made of a portion of the conducting wire holders. A portion of the connecting component 14 is located inside the package body for electrically connecting with the semiconductor chip 6 and the other portion is projected from the package body for electrically connecting an external circuit.

20 The second curved surface 18 is surrounded by the package body 16 and the chip is placed at a focus of the second curved surface 18. The surface of the second curved surface 18 is made of or coated with a material able to enhance the reflective capability. The second curved surface 18 is a smooth paraboloidal or ellipsoidal surface.

The optical semiconductor component includes a window 20 for light to pass through. The window 20 is formed by the first curved surface 10 and second curved surface 18. The semiconductor chips 6 and chip carriers 8 are placed inside the window 20.

5 The optical semiconductor component also includes a transparent optical component 22 used to cover the window 20. The optical component 22 can be a planar, convex or concave lens.

 The chip carriers of the present invention are independent components and have a multi-layer structure. The middle layer of the chip carrier is an insulator
10 used to separate the chip from the conducting wire holder electrically or thermally. Hence, when connected with a metal radiator, the chip carrier won't cause electric leakage.

 The connecting components of the present invention are mutually independent, which can provide multiple photodiodes with different driving
15 voltages to connect with each other in series or parallel.

 The reflective surface of the present invention is composed of multiple curved surfaces, which are paraboloidal or ellipsoidal surfaces. The chips are placed at the foci of the curved surfaces. Hence, the light can be reflected to the front surfaces of the chips effectively.

20 Although the present invention has been described with reference to the preferred embodiment thereof, it will be understood that the invention is not limited to the details thereof. Various substitutions and modifications have been suggested in the foregoing description, and other will occur to those of ordinary skill in the art. Therefore, all such substitutions and modifications are embraced

within the scope of the invention as defined in the appended claims.